Letter to the Editor

Boiling and Splattering Liquid With the Er:YAG Laser

In the article, "Generation of Infectious Retrovirus Aerosol Through Medical Laser Irradiation" [1], in vitro laser dispersal of infectious viral genes, infectious viruses, and viable cells is described. In this experiment retrovirus supernatant was irradiated with an Er:YAG laser using a 1.2-mm spot size at 5.3 J/cm^2 at 7 Hz for 70 sec (500 pulses of 250-μsec duration at 2.94 μ wavelength). The scattered material was collected in wells immediately adjacent to and level with the irradiated supernatant and was found to contain the viral genes and virus. Viable cells in a "semisolid medium containing 3% agar" were then similarly irradiated, and the scattered material (containing viable cells) was collected on plates positioned beneath this medium.

Having read this article, I put 1 cc of water in a laser-safe inverted external stainless steel eyeshield and placed it on a sheet of typing paper. I then irradiated the water with an Er:YAG laser with a 5-mm spot size at 5.0 J/cm^2 at 8 Hz (250-μsec pulses at 2.94 μ wavelength). Within several seconds, the water boiled and splattered drops all over the paper.

This boiling and splattering of water is totally unlike the clinical use of the Er:YAG laser when ablating human tissue, where a copious cloudy plume is produced above the tissue and which deposits an abundant, dry, cotton candy-like plume on the laser handpiece. (Hughes, personal observation) The Er:YAG 2.94-μ radiation effect on tissue is an explosive process driven by the rapid heating, vaporization, and subsequent high-pressure expansion of irradiated tissue [2]. The ablated material leaves the surface at a supersonic velocity of 10,000 m/sec [3].

The scattering of infectious material and cells in the in vitro retrovirus experiment may have been produced by boiling and splattering the material rather than representing explosive dispersal in a laser plume. The collection was done adjacent to or below the irradiated material. For this reason, it is possible that the authors' conclusion, that this laser may disseminate tumor cells and infectious particles in a clinical setting, is not substantiated by their data.

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